



Environmental
Export Council

Project sponsored by:



Cleaner, Safer Cement

Study Tour for the Central America and Caribbean Region

Environmental Export Council

ENVIRONMENTAL BUSINESS EXCHANGE REPORT

PROGRAM COORDINATOR: Denise Christiansen, EEC

PROJECT NUMBER

AND TITLE:

#LAG-A-00-93-00041-00

Latin America Initiative for Environmental Technology

PROJECT LOCATION(S):

Washington, DC; Dallas, TX; Los Angeles, CA, USA

DATES:

December 6-10, 1999

BACKGROUND

The *Cleaner, Safer Cement* study tour forms part of the collaboration between the Environmental Export Council (EEC), a project of Concurrent Technologies Corporation (CTC), and the United States Agency for International Development (US-AID) on the Latin America Initiative for Environmental Technology (LA-IET). The LA-IET is a cooperative agreement which acts as an umbrella program for various activities designed to promote private sector investment in environmentally sustainable development in the region. The vehicle for achieving this objective is a series of innovative partnerships to leverage resources from governments, the private sector, industry associations, and non-governmental organizations.

Building on the success of the LA-IET events to date, the *Cleaner, Safer Cement* study tour was targeted and developed as an environmental business exchange which focused on cleaner cement manufacturing in the LAC region. The goal of the activity was to provide additional support to heighten private sector awareness about pollution prevention incentives and opportunities, increase the sector's role in environmentally sustainable development including reduction of greenhouse gas emissions, and encourage investment in cleaner technologies and processes. Cement production was targeted because of the ongoing reconstruction efforts in the Central America and Caribbean region following hurricane destruction in the fall of 1998, and the resulting market demand for a range of construction materials. At the same time, advances in construction technologies have resulted in products that are stronger, safer and less harmful to the environment. Such technological improvements have yielded a manufacturing process with improved quality, reduced air emissions, and more efficient energy use. The activity

provided a unique opportunity to support technology transfer within this industry to improve safety, health and environmental quality in the long-term. The resulting benefits may include improved environmental quality in the region, reduced greenhouse gas emissions in-line with international commitments, as well as an improved product for cement consumers.

OVERVIEW OF STUDY TOUR:

1. Objectives

- Build awareness regarding alternative technologies for cement manufacturing.
- Facilitate partnerships for technology transfer between U.S. manufacturers and cement companies and associations in Central America and the Dominican Republic.

Participants from the Central America and the DR visited cement manufacturing facilities and met with various government and private sector technical experts in Washington, DC, Dallas, Texas and Los Angeles, California. Technical sessions and interactive discussions related to cement manufacturing technology, environmental policy, and financing provided the opportunity to exchange ideas and experiences related to cleaner production and improved performance. As with other LA-IET activities developed by EEC, the study tour also promoted the formation of innovative partnerships that leveraged the resources of the public and private sectors. The purpose in this was to transfer information related to energy efficient and environment-friendly technologies for the production of higher performance cement, and to foster sustainability in communication and collaboration across borders within the industry.

The attached **Final Schedule** details the specific sessions and site visits included in the event.

2. Participants

For this event, EEC targeted plant managers within cement facilities in Central America and the Dominican Republic who had both a solid technical knowledge of the manufacturing process as well as leadership responsibilities in order to foster greater direct application of the information and experience to the plant operations. A total of nine professionals from the region attended the study tour, representing five countries and six companies. The participating companies provided in-kind support for their participation through covering the international travel costs and time of their representatives.

A brief list of the participants follows. A full, detailed list, including contact information, is attached as the **Participant List**.

Participant	Company	Country
Edwin Enrique BARLEY Gayle <i>Ingeniero de Proceso, Coordinador de Preparación de Crudo</i>	Industria Nacional de Cemento	Costa Rica
José DÍAZ Chávez <i>Ingeniero, Proyectos</i>	Cementos Cibao	Dominican Republic
José Mauricio HERNÁNDEZ Cepin <i>Gerente, Geología y Minas</i>	Cementos Cibao	Dominican Republic
Yuri DURÁN <i>Gerente de Seguridad y Medio Ambiente</i>	Cementos Nacionales, S.A.*	Dominican Republic
Valentín FABIÁN German <i>Gerente de Negocio de Clinker</i>	Cementos Nacionales, S.A.*	Dominican Republic
Adolfo Narciso GRAMAJO Antonio <i>Superintendente de Optimización</i>	Cementos Progresos, S.A.** °	Guatemala
Jorge A. De J. BUESO <i>Jefe de Gestión Ambiental</i>	Cementos del Norte SA de CV** °	Honduras
Tomas Enoch CEDEÑO <i>Gerente de Proyectos</i>	Cementos Bayano*	Panamá
José Eduardo DOMÍNGUEZ Wolfschoon <i>Gerente de Transformación</i>	Cementos Bayano*	Panamá
TOTAL: 9 Participants	6 Companies	5 Countries

* Denotes company owned by CEMEX

** Denotes company owned or affiliated with Holderman

° Cementos Progresos is currently in discussions with Holderman. Cementos del Norte is ½ owned by Holderman, ¼ company-owned, and ¼ owned by Cementos Progresos, Guatemala.

3. Partner Organizations/Groups

EEC worked closely with the United States Environmental Protection Agency (EPA) and the American Portland Cement Alliance (APCA), in addition to USAID throughout the development of this program.

4. Presenters & Sessions

Gilbert Jackson, Manager, Urban/Industrial, Latin America and Caribbean Bureau, United States Agency for International Development (USAID), presented the first session for the activity, “Stronger, Safer Cement for Reconstruction in Central America,” and represented the project sponsor at the event. His discussion focused on how pollution is generated within the cement industry, and the range of approaches for addressing this, from pollution control to cleaner production.

Sandra Smithey, Department of Housing and Urban Development (HUD), held an informal discussion with participants on “Construction and Reconstruction in Central America and the Caribbean.” This provided the opportunity for the country representatives and HUD to talk about what is currently being done in the region, and the demands to be placed on the cement industry as projects are developed. Comments focused on how plants’ operations will impact the quality not only of the regional environment, but also of the construction materials and structures themselves. Ms. Smithey highlighted

the ways in which standards and/or preferences for ‘environmentally friendly’ products may be integrated into procurement evaluations and decisions, in support of a higher quality of cement products and a more environmentally-conscious method of manufacturing in the affected countries.

Pam Teel, *Office of International Activities, USEPA Headquarters*, reviewed the EPA Office of International Activities project portfolio in the region and gave participants an understanding of the agency’s initiatives across industries and countries. Ms. Teel is the EPA representative responsible for overseeing projects in the LAC region.

Andy O’Hare, *Vice President of Environmental Affairs, American Portland Cement Alliance*, presented two sessions; the first, “The Environment and the Cement Industry,” focused on the relationship between the environment and the cement industry in the US, and the impacts manufacturing has on natural resources, the community and the economic performance of the plants. The second presentation, “Current Industry Achievements and Challenges, and the Climate Wise Partnership Program,” provided an industry perspective of Climate Wise, the voluntary partnership program that promotes a comprehensive approach to industrial energy efficiency and pollution prevention. The participants found it very useful to learn about the current management systems and technologies used in the US; much of this information is used as a benchmark for assessing the state-of-the-art practices and systems. The cement professionals feel that information on innovations and standards accepted in the US assists them with pushing forward recommendations within their companies and countries. In this sense, the concepts learned during the study tour are not only helpful in terms of adapting the models and/or frameworks and applying them to their operations, but also to gain visibility in the eyes of senior decision-makers based on the fact that these efforts are priorities in developed countries.

Bryan Klotz, *Manager Engineering Services, Krupp Polysius Corp (“Polysius”)*, presented on “Cement Technologies, Focus on Energy, Costs and Emissions.” Polysius is an engineering company specializing in equipment and machinery for the cement and mining industries. It was formed 27 years ago and is an associated company of Krupp Polysius AG in Germany. Mr. Klotz discussed experiences with large kiln plants, tailor-made energy and cost-efficient clinker production lines, and experiences with the PREPOL MSC calciner and conversions. Polysius was a key partner in providing technical information, particularly related to cutting edge technologies and systems. Bryan’s discussion was well-received by the participants and was very useful to them, especially given that it included many diagrams and photos. In addition to his presentation to the group in Washington, Mr. Klotz, along with his colleague, Marcos Alegre, joined the site visit to California Portland Cement’s Colton plant.

Frank Behan, *Environmental Engineer, Office of Solid Waste, EPA*, discussed US air emission regulations in his presentation, “New Air Emission Standards for Portland Cement Manufacturing.” Since environmental regulatory frameworks in Central America and the Caribbean are not as developed as in the US, the participants were very interested to learn about the limits and controls in effect, and how companies in the US have adapted their operations to meet these requirements. Based on this information, in their follow-up plans several participants are including a review of the US framework to determine how they can work more closely with their own government to apply appropriate standards.

Kevin James, *Climate Wise Program, USEPA Headquarters*, covered two inter-related sessions during the study tour. The first, “Introduction to Climate Change,” provided participants with an overview of the cause and effects of climate change, and how that relates to the cement manufacturing process. Participants noted that, while they understood that this topic was receiving a lot of attention from both a political and a social standpoint, they actually did not fully understand what the term meant nor the scientific basis for the discussions. In this sense, this topic was important in providing a foundation of

knowledge to relate climate change issues directly to the industry. The second discussion, “Government Environmental Programs as Models of Public-Private Sector Collaboration,” covered various approaches and models developed to promote public-private sector cooperation to confront and address environmental challenges. The focal point for this session was the Climate Wise program, and participants noted that this as well as the other partnership models will be helpful tools as they look more closely at how the government and private sector can more closely work together in their countries.

Dan Billelo, *Climate Policy and Programs Division, Office of Policy, USEPA Headquarters*, discussed with participants the “Clean Development Mechanism,” or CDM, projects. These projects are mechanisms to support global climate change reductions by encouraging greenhouse gas reductions wherever they may be within industry as a whole. For example, through CDM projects, companies which release air emissions would be able to counteract the pollution caused by their manufacturing process through supporting (i.e., funding) projects to reduce emissions caused by a company in a developing country. The end result is an overall reduction of emissions, investment in a developing country to support sustainable development goals, and action on the part of a polluting company which brings about results but saves them the large-scale and costly efforts of retrofitting existing structures. The CDM system relates to the proposed framework for emissions credits and trading. The participants were very interested in this concept and how they might be able to get support for their environmental projects. At the same time, they were concerned about the idea of foreign companies having too much information on their operations and/or too much control over what they do.

Heather Tansey, *Climate Wise Program, USEPA Headquarters*, provided a software presentation on the Climate Wise Cement Emissions Tracking Software. In addition, she offered to facilitate the participant discussion on environmental issues and technology needs, and joined the tour for all of the sessions and the NIST site visit in Washington. The participants found the software presentation interesting, although, it may have been more effective by demonstrating the software through projected images of a computer screen rather than with overhead slides. The participants wanted to know how to get a copy of the software and understood that it was part of a package of many other tools offered as part of participating in the Climate Wise program. One consideration to keep in mind when looking at measuring air emissions is that the Climate Wise program focuses primarily on CO₂, whereas participants were also interested in physical emissions such as kiln dust. Plant technicians and local enforcement representatives addressed these broader issues during the site visits.

Helen A. Chaikovsky, *Environmental Enterprises Assistance Fund*, talked with participants regarding “Financing Options.” She described to them the mission and projects of the Environmental Enterprises Assistance Fund, a 501(c)(3) created in 1990 by Winrock International, the Rockefeller Foundation and USAID that finances new projects (\$100,000-\$800,000 with \$500,000 as the average size) developed by small or medium-sized enterprises. The project areas are organic farming, sustainable forestry, renewable energy sources, energy consumption reduction, waste treatment, recycling and reduction, and sustainable tourism. Most of the cement projects would fall in the area of energy savings given that energy use is the biggest area of environmental impact and cost to the company. Participants were very interested in this information although one drawback is that the fund does not currently operate in the Caribbean. Helen was also very gracious to broaden her discussion when the Export Import Bank speaker who was scheduled to address to a wider array of financing tools throughout the LAC region, did not show up.

Pete Goerdel, *Environmental Engineer, Air Enforcement Section, EPA Region 6*, joined his colleagues in discussing with participants “Air Quality,” including cement air pollution management issues and air the only person in the meeting who did not speak Spanish, and allowed his colleague, Matt Witosky to take the lead.

Matthew Witosky, *Environmental Policy Specialist, USEPA Region 6*, led a very useful discussion session, conveying information and fielding questions.

Jorge Rojas, *Environmental Investigator, Region 4-Arlington-Air Program, Texas Natural Resource Conservation Commission*, was a valuable representative to complement the EPA information and provide the participants with a comprehensive view of the government's local and regional responsibilities to enforce regulations set at the state and national levels. While at the TXI plant earlier in the day, participants saw a computer screen with live data on the plant's emissions, and were told that the environmental authorities had access to the same screen. The meeting in the afternoon that day gave them the unique opportunity to talk to the other side, the government enforcers, and ask about these types of practices. When asked about the computer screen, Jorge commented that he has access to the exact same data set from his office. Participants were amazed at the systems for regulating industry and appreciated hearing both the government and industry perspectives as part of the tour, an opportunity which they do not have in their own countries.

5. Site Visits

National Institute of Standards and Technology (NIST)

Description: NIST is part of the United States Department of Commerce (DOC), and its mission is to "assist industry in the development of technology...needed to improve product quality, to modernize manufacturing processes, to ensure product reliability...and to facilitate rapid commercialization...of products based on new scientific discoveries." Within NIST, the Building and Fire Research Laboratory is the national laboratory dedicated to enhancing the competitiveness of U.S. industry, public safety performance prediction methods, measurement technologies, and technical advances needed to assure the life cycle quality and economy of constructed facilities. Its products are used by those who own, design, construct, supply, and provide for the safety or environmental quality of constructed facilities. During the site visit to NIST, participants talked with staff to learn more about the research being done on cement and related materials, what they are testing and results/observations to date.

100 Bureau Drive, Stop 8620
Building 226
Gaithersburg, MD 20899-8620
www.bfrl.nist.gov

Comments: Participants were surprised to learn that research was being conducted specifically on cement and concrete, and were amazed at the type of data that is available there. Some found this to be one of the most valuable discussions in the study tour and most were interested in knowing how the research could be made available to a wider audience and/or how external samples could be analyzed by the lab.

Dr. Geoffrey Frohnsdorff, Chief, Building Materials Division, Building and Fire Research Laboratory
Dr. Edward Garboczi, Leader, Inorganic Building Materials Group, Building and Fire Research Laboratory

TXI (Texas Industries)

Description: TXI's Midlothian plant, the largest cement manufacturing facility in the Southwest US, is currently expanding and simultaneously improving environmental performance. TXI staff led a tour of the Midlothian plant to show the phase-out of two wet kilns,

Midlothian Cement Plant
245 Ward Road
Midlothian, TX 76065
Tel: 972.647.4962
Fax: 972.647.4907
www.txi.com

construction of a new 2.2 million ton pre-heater, pre-calciner kiln line, and the application of environmental abatement/pollution control equipment. In addition, participants learned about the plant's use of waste derivative, hazardous liquid fuels.

Comments: The plant is very old and is heavily monitored by the Texas Natural Resource Conservation Commission and the EPA. There is a live feed of emissions data 24-hours a day, surprise inspections and 2 audits per year. It is also under surveillance by the community due to its high use of alternative and hazardous fuels and materials, and the fact that it uses a wet process—the only one of the three plants visited to have this. Tours are usually requested by community and school groups. They maintain a policy requiring management review of all negatives of pictures taken by visitors; this left participants feeling that the plant was not as open as the others. The TXI staff was helpful in introducing participants to how they use, make decisions about, and prepare systems to use hazardous materials and other alternative fuels—they were very interested in this, and of the three, this was the facility that had the most experience in this area.

Mark Hill, Plant Manager

Jeff Wendell, Quality Control Manager

Rick Dempsey, Recycled Fuel Facility

John Dodd, Operations Manager

Jesus Martinez, Financial Analyst

Guest company:

FULLER COMPANY: *Julian Lewis, Vice President*

Comment: Company is part of a European-owned group. Mr. Lewis' discussion focused on marketing and the discussion was not further pursued by the participants.

Holnam Texas, Ltd. (a "Holderbank" Group Company)

Description: The Midlothian plant consists of one 4-stage preheater/pre-calciner kiln with rated capacity of 1.0 million tons/year that began operation in 1987, and a second kiln of similar size under construction scheduled to startup in February 2000. Both kilns will have state-of-the-art technology, including the use of gas flue wet scrubbers, continuous emission monitors, and will utilize alternative fuels to make it one of the most efficient plants in the country.

1800 Dove Lane
Midlothian, TX 76065-4435
Tel: 972.723.9223
Fax: 972.299.6960
www.holnam.com

Comments: The Holnam tour was led by Maria Githiri who is relatively new to the plant, with support from Lauro Pulido who is a native Spanish speaker and who has worked there for many years. The plant was a great host and the staff went out of their way to answer questions and make the group feel welcomed. As an introduction to the plant, Ms. Githiri described the full mining to shipping process at the plant using two different models that were very effective in orienting the group before touring the facility. The company prides itself on cleanliness and efficiency, and tours are generally given to investors.

Maria Githiri, Process Engineer

Lauro Pulido, Production Supervisor

Randy Walser, Plant Manager

California Portland Cement Company

This plant has a long dry process that uses alternative materials for fuel such as tires, and conducts continuous emissions monitoring. It serves as a model of newer processes built from the ground up with advanced technologies. Bryan Klotz and Marcos Alegre of Polysius, joined the tour to talk about the company's work with California Portland Cement to promote fuel savings, cleaner production and improved efficiency in the plant's operations.

695 S. Rancho Avenue
P.O. Box 947
Colton, CA 92324
Tel: 909.825.4260
Fax: 909.370.3306
www.calportland.com

Comments: California Portland Cement brought together a large group of people to meet and answer questions for the group, one of the most cross-departmental representations in the study tour. Staff was generous in their time and personal attention to the group. The plant is relatively old but the participants commented that the management seems to be very good and that they are adopting technologies which bring it to par with newer facilities.

David Cahn, Senior Vice President, Corporate Services
Salvador Cendejas, Project Engineer
Joe Cordero, Shipping Supervisor
Timothy Keyes, Environmental/Health Administrator
Brent Loomis, Human Resources Manager
Dale Poole, Plant Chemist
D. M. Robertson, Plant Manager
Gary Thornberry, Environmental/Plant Services Manager

Guest companies:

Dameron Communications: *Carl Dameron*, President

Comment: This company is contracted to provide public relations support for the company and assisted EEC with site visit communications and preparations.

Krupp Polysius Corporation: Bryan Klotz, *Manager Engineering Services*, *Krupp Polysius Corp* ("Polysius") and Marcos Alegre, *Construction Services Manager*.

Comment: Polysius also gave a presentation earlier in the week; participants were impressed that the company made an effort to spend time with them on not one, but two days and in different cities, neither of which was their home office. The information provided by the representatives was well received.

5. Discussions

The following are notes on various discussions held throughout the week:

Discussion: [Participants'] Key Environmental Issues and Technology Needs, Monday, December 6

- Particulates
 - Capturing them
 - Disposing of the waste
 - Solving process leaks
- Water treatment and technology (given that the supply is rural)
- Reuse of industrial waste
- Reforestation

- Runoff
- Community issues

(More information on industry information may be found at es.epa.gov/oeca/sector/index.html under, “Sector Notebook/Data Refresh 1997.” This provides a profile of stone, clay, glass and concrete).

Notes on LAC versus US industry:

LAC

- Many different types of cement are commonly used and are sold for different applications—blended cements are accepted for houses and other small projects; Portland Cement is more expensive and is used primarily for large infrastructure work, such as bridges and highways.
- The government sets cement prices. If foreign competition reduces their prices, the local companies are obligated to reduce theirs as well.
- The companies’ relationship with the buyers is closer than in the US.
- They do not have as much sulfur in their production because the limestone they use is different than what is found in the US.
- Only one plant represented (Cementos Cibao, Dominican Republic) has a wet process; all the other plants are dry.
- As a comparison in size, the production of Cementos Nacionales in the Dominican Republic is approximately half that of TXI.

US

- It is difficult to sell blended cement because the consumers have the perception that it is of a lower quality; since the blending and adding of material increases the volume of cement produced. Since this increase in volume benefits the manufacturer, it is perceived that this must be putting the consumer at a disadvantage, or that they are being asked to accept something that isn’t “pure” Portland Cement.
- The government is the largest consumer of cement; in looking at how to further integrate blended cement and other products into the market, it is understood within the industry that the government must first be convinced and that it would have to be the “guinea pig” in order to prove the products’ quality. Given the high costs of construction and safety concerns, it is difficult to change purchasing habits.
- Emissions trading is favored by companies based in the US as long as there is no tax on the credits. This is seen as a way to make the most cost-effective changes, wherever they may be found in industry as a whole, to support the protection of the environment without closing facilities.

Notes on Climate Wise

Process followed by EPA:

- Created a database of industrial emissions
- Narrowed the scope of what is covered in the program to make it simple (i.e., target problem points for CO₂ emissions)
- Conducted industry outreach
- Secured top-level buy-in within the participating companies
- Reported back to EPA and DOE

Concluding discussion, Friday, December 10:

- Participants debated the driving force for the top management to pursue environmental initiatives. One participant argued that everything relates to lowering costs in the plant; a second, from the same country, argued (with others agreeing) that true change and leadership would only come from having a larger vision of why the change is important from a community, national and global perspective. A third participant expressed his interest in these issues based on the international precedents set by the Rio de Janeiro Summit, NAFTA, UN sustainable development efforts, and other agreements.
- Participants also debated the role that international assistance should play in these efforts. On the one hand, they argued that they themselves must be leaders and must assume the responsibility for making change. A second participant noted that two things must be kept in mind: First, that information, data and technology exist that are simply not accessible in their own countries, and for this they need to look to international partners. Second, they have first-hand experience being wooed by European aid offers (primarily German), which are tied to an effort to build long-term relationships in-country. These European representatives offer local counterparts countless resources, and even send technical manuals and other information free of charge. The participant acknowledged that the relationship with a German company that was trying to build a relationship with them failed because of his own lack of interest in pursuing it, not for lack of enthusiasm or support on the German side.
- Key goals for projects include reducing the amount of clinker used (53% of the CO₂ emissions comes from clinker emissions), lowering CO₂ emissions, and increasing the input of alternative materials and fuels.
- All participants expressed interest in organizing cooperation among the countries—they are interested in working with CTC/EEC to facilitate this.
- One Dominican Republic representative expressed interest in establishing an NGO or some other mechanism to exchange information and have it available on industry-related topics; there is a strong desire to share information on technology.
- All participants agreed that, based on the success of this study tour, they would approach their plant managers to discuss the degree to which the plant and company would commit to their and the participant's involvement in a coordinated effort with regional colleagues to share information. They recognized that they would need the company to be fully behind their efforts to dedicate not only their own time to these efforts, but also to secure the support of colleagues and other technicians in the plant who may need to be involved.
- Participants held a nomination process among them to select a "Coordinator" who will incorporate their efforts, unite them as a group, and recruit other companies and representatives in the region. Yuri Durán, Dominican Republic, was among the individuals nominated and he accepted this responsibility.
- Participants set a deadline of January 15 as the date by which they should get back to Yuri with the responses from their plant managers.

6. Participant Action Plans

The following is a summary of the most common goals set by participants in order to apply the information and experience gained through the study tour to their own responsibilities in their plants:

Common themes

- Use of alternative fuels and materials.
- Intent to make environmental concerns and evaluations a greater part of project development process.

- Interest in exchanging information within the region, particularly on technology and environmental regulations.
- Increase communication and cooperation between the government and the private sector.
- Reduction of air emissions, particularly dust and CO₂.
- Share information, build capacity and raise awareness of environment-related issues within the plants and companies.

Copies of the **Participant Action Plans** (translated into English) may be requested from EEC.

7. Evaluations

Was the study tour conducted at the appropriate technical level?

Yes: 99.98%

No: .02%

What relevancy does this type of study tour have to efforts to transfer technologies and management techniques to countries/region?

Very much: 100%

Some: 0%

None: 0%

The following is a summary of the responses to the evaluations:

Participants found that the most useful aspects of the seminar were:

- Information on regulations and enforcement.
- Models for industry and government cooperation on environmental issues.
- Discussion of environmental management and technology needs in LAC and how operations can be improved in region.
- Information on controlling air emissions.
- Site visits that complemented one another and showed cutting-edge technologies.
- Methodology of the Participant Action Plan (PAP)
- Insight into use of alternative fuels and technologies, systems and financial investment required for their use.
- Model for developing inter-industry relationships between cement plants and producers of alternative materials and fuels.

Participants will use the information gained during the seminar to:

- Improve the manufacturing efficiency and improve plant's performance.
- Gain company management's commitment to environmental quality.
- Conduct materials and fuel substitutions.
- Train colleagues and raise awareness.
- Promote the linkage of process improvement to environmental performance improvement in project development.
- Build relationships with the organizations/groups to follow through on action steps and goals.

- Develop contacts within the industry to share information on regulations and controls
- Stimulate the development of environmental controls in the plant, and in the country.

Suggestions from participants for continuous improvement of activities:

- More time for sessions, questions and site visits.
- Integrate presentations and site visits to run them simultaneously or have them interspersed.
- Provide more detailed technical document that captures the key aspects to be presented.
- Start site visits earlier and make them longer.
- Include social activities in the schedule, for example a city tour.
- Concentrate activities in two cities.